TRANSACTIONS OF THE INSTITUTION

Presidential Address.

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To the Twenty-First Annual General Meeting of The Institution of Engineers, Australia.

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For the past year it has been my honour and my privilege to hold the Chair of The Institution of Engineers, Australia; and now to-night it becomes my obligation to relinquish that office with regret—and with pleasure. With regret, because the incidence of war has prevented me from giving to the affairs of The Institution that wholehearted attention I once hoped would be possible; with pleasure because I hand over to Mr. J. P. Tivey who, owing to my personal isolation in Western Australia, has been obliged to shoulder, on my behalf, much of the burden of office. I am happy to have this opportunity to thank Mr. Tivey for his unsparing and able assistance; and I know members will soon realise, as I have realised throughout the year, how fortunate we are in our new President.

During my year in office, I was able to attend general meetings of Divisions at Sydney, Melbourne and Adelaide, Newcastle and Canberra. I also attended Division Committee meetings at Melbourne and Adelaide. Very fortunately, Mr. Maclean had sufficiently recovered from his recent severe illness, to be able to accompany me on all these visits. I would like also to make this an opportunity to pay tribute to our Secretary for the way in which he devotes himself to the work of The Institution. Never, for even the shortest period, does he allow himself to fall into the easy rut of a routine job. It might be said that Mr. Maclean's life is dominated by a single sincere purpose: the advancement of The Institution. Possibly only those of us who have been members of our Council, fully appreciate all that our Secretary has done, and still is doing, for the betterment of Chartered Engineers in Australia. The heavy work entailed by the changes due to the granting of a Royal Charter has, quite apart from normal business, fallen almost entirely upon Mr. Maclean.

We all know how greatly the destiny of Australia has been challenged, this past year, by European conflicts. Already our future is shadowed, like the rest of the world, by threat of a dark New Order. We realise that unless we overcome this menace, it will assuredly destroy both our present way of life and our future hopes of building an Australian democracy according to our own specifications. Had this terrible disruption not occurred, then to-night I would have discussed in some detail the future of the North of Australia.

For the past twenty years that part of Western Australia lying above the 26th parallel of latitude has been my special province. The problems of the North arise from gigantic tide-falls, from cyclones, soil erosion, great empty spaces, a handful of white men, and some considerable number of those aboriginal inhabitants of Australia whose existence is scarcely realised in our large cities. I had therefore proposed, in this address, to put before you some facts about our North and to discuss the possibility of a scheme for the development and population of the North, which development and population must be regarded as one of our national problems. It is certain that satisfactory development can never be achieved without some solution of the aborigine question. These are unusual aspects to present to engineers, but because they are aspects which touch my own sphere so closely, and because it is becoming more and more urgent for engineers to turn their attention to the social as well as the technical advancement of mankind, I ask you now to find time to think about them during the coming year.

As far as I am able to sum up, the North of Australia presents three outstanding and urgent problems:—

Firstly—Necessity for Population;

Secondly—Natives;

Thirdly—Engineering Works.

The war, however, has forced all such problems into the background. But strange as it may seem, the Nazis have indirectly created a possible solution of the Northern Australian population problem, a solution which can be mentioned before passing on to matters of more immediate concern.

Shortly before the outbreak of war, Dr. I. Steinberg arrived in Australia to make inquiries on behalf of the Jewish Freeland League. Dr. Steinberg spent some considerable time in the Kimberlies, and was accompanied by a State agricultural expert. Later, Dr. Steinberg worked out a scheme for the settlement in the North of Jewish refugees from various European countries. A well-balanced mixture of personnel was sought, one which would be very unlikely to raise any minority problems. The cost of this settlement was to be financed entirely from non-Australian funds, and in no way and at no time was Australia to be liable for possible failure.

Years of experience, and personal study of the country selected for the purpose, lead me to believe that the Steinberg scheme would be very likely to prove successful, provided that the settlers command sufficient financial backing and have, in themselves, the will to succeed.

As outlined by Dr. Steinberg, the scheme at first is merely one of closer pastoral settlement—a number of holdings ranging from, say, 10,000 acres as against the million acre stations at present so common. The area available is large, with a present population of about ten white people to a million acres of land. The soil is good, the rainfall quite considerable, although unfortunately somewhat unevenly distributed; that is to say, the seasons fall in to dry and rainy periods corresponding with the prevailing monsoons of tropical countries.

In the wet season the climate is hot. The Kimberlies might be said to have many of the disadvantages of a tropical climate, and none of the advantages. This fact is largely responsible for preventing adequate settlement by Australians. Dr. Steinberg remarked, however, that the rigours of the climate were as nothing compared to the rigours of life under Hitler.

I must admit that the possibility of quickly populating the all but empty North, under ordinary circumstances, with white people, had come to seem very improbable to me. Australians themselves are most unlikely to settle there and develop the land, until such time as the temperate southern areas have been fully opened up and are much more densely populated—which presumably will take some hundreds of years. The discovery of oil, or some other fortuitous chance, would doubtless work miracles; but one cannot plan the development of the North, as too many people have done in the past, on a foundation of wishful thinking.

Even before the war, on account of the extraordinary conditions prevailing in Europe, thousands of white people, then mainly Jewish, were looking for new homes. *Now millions from many races have become homeless, and from these millions it should surely be both possible, and practical, to draw some thousands of suitable settlers to make a nucleus in the empty North of this country, whose emptiness every year becomes more of a menace to ourselves.*

This opinion, like any other, will doubtless be greeted with opposition in some quarters. I would remind you, however, not only of the success of the Jewish agricultural settlements in Palestine, now vouched for by eye-witness reports from our own troops, but also of the material advantages which Great Britain has received throughout the centuries, from the floods of refugees who have from time to time swept into the British Isles from the continent. In the seventeenth century official relief committees were formed throughout Great Britain to help the Huguenot refugees; 13,000 were absorbed in London alone. It is estimated that between 80,000 and 120,000 landed in England—80,000 would then represent 1.6% of the population —and were assimilated. They introduced to Great Britain the linen industry, silk weaving, making of glass, lace, etc. —one might almost say that they laid the foundation of England's great industrial fortune. They taught their skills. They became a benefit and a stimulus. Equally, I am convinced, a Jewish settlement scheme for the North-West, properly sponsored and financed by the Freeland League, would become a benefit and stimulus to Australia. It would be interesting to discuss all aspects of this scheme, but under our present war conditions, as I have already said, other matters seem more urgent and appropriate. I do, however, wish to express the opinion that Australians would be wise to give immediate attention to this idea of northern settlement by European refugees. The sooner we can find friendly white settlers who can ultimately be absorbed into our own community without racial disharmony, then the better for us. Meantime—and it cannot be too greatly stressed—the vast emptiness of the Far North remains a danger never fully appreciated by the majority of those who live in the south.

I would like also, for a moment, to draw your attention to the native question. It has been estimated that some 50,000 natives still remain in Australia, in addition to 25,000 half-castes. The majority of pure-blooded aborigines live in the northern areas of the continent. Many schemes regarding these people have, from time to time, been put forward, notably those involving segregation. There is not time here to air the diverse arguments advanced both for and against various such schemes. The debate drags on, now loud, now *sotto voce*; but meantime, and quite regardless of policies, a process of natural solution is taking place. *The sooner we realise that, whether we like it or not, the aboriginal race is slowly being bred into our own, then the better for both races.* This absorption appears to be inevitable. Moreover, since the anthropologists assure us there is no possibility of drastic throw-back, it would also appear, when regarded with far-seeing eyes unclouded by immediate or personal prejudice, as being a humane and reasonable solution of the native problem. *Therefore, it might be said that one of the first duties of Australians, both to themselves and to the aborigines, is to see what wisdom and justice alike demand, that the native and half-caste way of life be immediately raised to the highest possible level.* The inevitable absorption may then, in the hot northern climates eventually become a national asset. But if, as at present, the native race is allowed to deteriorate through malnutrition, lack of reasonable education and general indifference on our part, there can be no doubt whatsoever of such absorption becoming a bad liability. In short, since the aboriginal Australian type is vanishing by absorption, racial traits must inevitably remain with us. Therefore it is urgent to see that we inherit the characteristics of a happy and healthy people, instead of the weaknesses and vices of a race we have ourselves degraded.

Greatly increased population and an absorbed native race must be regarded as the basis of all future closer settlement in the North. At this point, then, the relationship of the foregoing remarks with pure engineering becomes apparent. Closer settlement in the North can only be achieved, in my opinion, by irrigation on a vast scale.

The variable nature of the northern rainfall has already been noted, but this seasonal difference of wet and dry periods, is rendered agriculturally difficult because of long dry spells, almost drought spells, between rains. The average yearly rainfall in inches is high, and consistent. The dry interim periods are inconsistent. Any settlement other than pastoral will immediately call for conservation and distribution of the enormous volume of natural waters now running yearly to waste. As you may imagine, this subject offers tremendous scope for sound and imaginative engineering planning. My purpose, as already stated, in drawing this field to your attention to-night, and in sketching rapidly what in my opinion are the three outstanding requirements of Northern Australia, is a hope that members will from time to time spare thought for what must be regarded as a national problem of some urgency, one which after the war will need to be brought very rapidly into the region of practical politics. It might still even be possible to begin some small refugee settlement scheme in the immediate future, and so lessen the undoubted military weakness of our sparsely inhabited northern areas.

The defence of Australia, as an integral part of the defence of the British Empire, which at this moment means also the defence of democratic ideals and realities, is the one great problem which needs must, if we are to be victorious, occupy, in some form or another, every active mind in Australia.

For eighteen months Australia has been at war. During that period we, as engineers, both individually, and collectively as an Institution, have made considerable contribution to the national effort. Observation leads

me to believe that materially we have done everything that has been asked of us. But observation leads me also to believe that, one might say morally, there is much more we can do; and, at the same time, much more we should be asked to do, materially, by the leaders of the Commonwealth. *A body of opinion such as our Council offers, were that opinion sought and utilised, must surely prove of immense value at the present time.*

Immediately the international situation became a direct menace, The Institution arranged through its Divisions for a registration of all members. This information has proved of some use, both for military and industrial purposes; nevertheless its application has fallen short of what we hoped.

Up to the present time The Institution has supplied approximately two hundred officers for the fighting forces going abroad, and some hundreds for Militia and Home Defence, which include necessary requirements for the Engineer Services for Navy, Army, and Air Force, and the Command Staffs throughout Australia.

As you know, the *National Security Manpower Regulations* prohibit the general enlistment of engineers. Their services must be required for the Forces in a technical capacity, before any can be released for service either at home or abroad. It is, moreover, necessary to limit the Defence Forces to bare technical necessities, because of the vital needs of ordinary essential services, such as water supply, sewerage, lighting, lines of communication, etc. The adequate staffing of such services is possibly, at this moment, even more necessary than the staffing of Home Defence, because the maintenance and smooth running of such essential services might be called the starting point of all national war effort.

In addition to these various service needs, enormous demands have been made on our members by the construction of new factories for the manufacture of war equipment, and also for supplying such home requirements as were formerly imported. Following the completion of new factories, comes an ever-increasing demand for engineers to engage in every form of war industry. Never before in the history of Australia have the members of our Institution been so sought after. Already, the demand for technical experts in every grade of our profession, can indeed only be met with difficulty. Meantime, industrial expansion continues on an unprecedented scale, and will continue to absorb more and more Chartered Engineers. We could, I think, ask ourselves whether, as an Institution, we are doing enough to speed up training of technicians so that the increasing demand may adequately be met.

Small arms, ammunition, 'planes, war equipment of all kinds is now being manufactured in Australia to an extent which would have seemed fantastic twelve months ago. Before the war, Australia manufactured but a small percentage of her total civilian requirements—there were hundreds of imported articles which we had no means of making, even had we so desired. As for lethal weapons—with the exception of rifles and rifle ammunition and possibly some few similar lines—such things were beyond our horizon. To an extent, aeroplane building had commenced, but generally speaking, and for all practical purposes, our navy, our land forces, our air forces, were all armed and even mainly equipped from overseas.

The position to-day is startlingly, magnificently different. What manufacturing industries we had, both light and heavy, have been swung over from peace-time production to the making of guns, shells, the thousand various necessities of war. New factories have arisen. And, because we were unable to import even the necessary machine tools, we have made those tools. *Probably the machine tool industry in this country as it stands to-day, can justly be regarded as Australia's greatest feat in her war effort to date.* To take just one example, a firm which did not even exist twelve months ago, is to-day copying 24 German cartridge machines. Possibly only a section of our own members, even, realise how much has been achieved, whilst the general public appears to be entirely unaware. It is almost unbelievable that Australia should already be sending overseas vast quantities of war materials, in addition to equipping and keeping supplied the Navy, A.I.F., Air Force, and Home Service units. Dozens of technical schools throughout the Commonwealth are working two shifts a day in order to train the skilled men required for the proper usage of precision tools, and factory work generally.

Towards the end of last year, the Department of Information issued a pamphlet on *Australia's War Effort.* This contains a number of interesting facts and some useful figures, and could with advantage, be more freely circulated. Perhaps a few figures are worth quoting now.

For instance, War expenditure from 1938 until 1942-43 is estimated to cost £453,000,000 as set against the total cost of £270,000,000 approximately for the last war. Moreover, for the first 10 months of the present war, enlistments for overseas totalled 121,230 as against 26,845 for the first 10 months of the 1914-1918 campaign.

The Government's policy to provide a land force of 250,000 for Home Defence is already well on the way towards completion. By October last, the personnel of the R.A.A.F. was eleven times greater than at the outbreak of war.

By June, 1940, 15,200 persons were engaged on essential work, producing munitions in government factories and munition annexes. This figure had increased to 22,000 by October of the same year. During the last war the highest number ever employed on munitions was 2,737. Now production is protected by a number of reserved occupations; 15,000 men have already been refused permission to enlist on the grounds that they could best serve their country by remaining in industry. By July, 1941, it is estimated that 150,000 people will actually be engaged on the production of munitions and material for munitions.

No less than seven shipyards are already engaged in Naval shipbuilding as against one operating at the outbreak of war. It is expected that 50 patrol vessels will be completed in Australia by the end of the year. Provision for the construction of destroyers and escort vessels is also included in the first £6,000,000 building programme.

The rate of output of rifles was 15 times greater at the end of May, 1940 than in April, 1939, and the rate of output of machine guns was 6 times greater.

Early last year the building of a £300,000 factory for 25-pounder guns was authorised by the Government. It was stated at the end of October last that the factory would be in production shortly.

The number of military aircraft in Australia has been more than doubled, and we are also building our own aeroplanes. Factories have been erected in New South Wales, at a cost of a million pounds, for the manufacture of twin-row wasp engines for bombers.

Under war conditions, the Government assumed the responsibility of marketing all principal primary products;

within five months, contracts were arranged for the sale of £113,000,000 of wheat, wool, meat, etc.

These facts all show that a very considerable effort has been made. But, great as our effort has been, I am convinced it should be—that it *must* be—infinitely greater—if we are to be left free to follow our own way of life and write our own specifications for a future existence unshadowed by that dread New Order now darkening Europe. I have dwelt on what we have done, merely because I feel that more general awareness of already great achievment, can do much to assist Australians towards that gigantic effort we know ourselves capable of making, once we are convinced, as a Nation, of the urgent necessity. We have been slow to start. Now when at last we are making rapid progress, too often spanners are thrown into the wheels, spanners which can be labelled " Lack of Unity," spanners which eventually wrecked the whole works in France.

There is nothing to be gained by denying that a certain complacency does exist; an empty complacency, unfortunately, with nothing to prop it should we suddenly be called on to face cold steel.

Possibly this nebulous complacency on the part of the people of Australia, or what is more probable, and altogether regrettable, the subtle poison of interstate jealousy, is mainly responsible for incomplete co-ordination between State and Commonwealth Governments, between State and Commonwealth politicians and civil servants. But be the cause what it may—it remains a fact of some urgency, and one is tempted to add, a matter of ordinary common sense, that better feelings should be fostered so that State and Commonwealth services can be united by one common will in one concerted effort, to expedite the winning of the war.

Professionally, engineers are intimately connected with heavy industries and Government works. It is my conviction that the individual influence exercised by our four thousand five hundred members could be, must indeed be, very considerable. It should be possible for engineers, individually, to prevent many a small spanner from becoming a hindrance. Most engineers come in close contact with those men, from every walk of life, who at present turn the wheels of production and maintenance. I would like to quote you here the words of Mr. Wilfred Ayre, President of The Institution of Engineers and Shipbuilders of Scotland. " When we succeed in eliminating causes of delay," he says, " we shall assuredly solve one of the greatest and most pressing problems of industrial production. Without planning there can be no effective control of output and without control there can be no efficiency in manufacture."

In times of peace, the benefit of the unification of Australia is a debatable point; but it is difficult to imagine that balanced minds could have any but one common thought regarding the vital necessity of unity in war time. Yet at this moment we have six Australian States each endeavouring to procure funds to carry on with the normal development of a country that is really fighting for its continued existence, as we understand that existence. A peculiar position! It cannot be denied, of course, that each State still has its own problems, and in some States unemployment remains a major issue. It should be possible to rectify this anomaly. When money and labour are alike needed for industrial war effort it seems extraordinary for any of the national resources to continue to be used in unemployment relief works, with many men still merely labouring part time on works of ordinary peace-time development.

Surely it would be wiser for all funds to flow for war production needs only, and none be dissipated in works of general development which cannot serve the country until the war is won. Our Institution is an Australia-wide body. To a very large extent our members direct the labour of Australia, whether it be in works of construction, manufacture or maintenance. It might be said that a nation's war effort is built upon the technical abilities and will to work of its engineers. *It remains for us then, as a body, to see if we cannot help further to unite political, business and other interests in the more vital general interest of a greatly increased war effotr.*

In England, long before the war, shadow factories had been arranged. I feel sure that if we could see the present scale of organisation, we would be staggered by its vast proportions and realise that such complete organisation would be utterly impossible were it not for the unity of will of the people of Britain. History may show us that this unity was achieved only after the disaster of Dunkirk and the collapse of France, but one does not like to think that any disaster in Australia, similar to the evacuation of Dunkirk, will be necessary to awaken our people to the urgency of concerted effort. Unfortunately, few members of our profession enter into politics, so that the advice of men who actually control so largely the output and public works of Australia, is rarely sought except on technical matters. This omission is partially due to an almost ethical disregard for the general problems of humanity; an attitude of mind which up-to-date has coloured our outlook so considerably, that most engineers have imagined they served best the interests of their profession, their countries and themselves, by attention to strictly technical problems. That humanity as a whole would benefit by a change of viewpoint in our profession, has been felt by a few for some years. That such a change is not only desirable but necessary, is now being advanced as worthy of thought, in almost every journal connected with our profession. The individual idea, one might say, is gradually expanding into a professional attitude.

Such a change of attitude could not, naturally, even were it suddenly to become both universal and determined, take much positive effect at this moment. The only way in which the practical training and long-distance vision of Chartered Engineers could influence policy, in the immediate future, would be for the Government to realise the existence of, and seek in an advisory capacity, the services of our Council. *The continent-wide scope of our activities gives to the Council, representing as it does highly qualified opinions from all States, the nature of a ready-made committee able both to devise and consider adequate means of abolishing sustenance loan works by improved distribution of war-time industries and general organisation.*

Such a move on the part of the Government may seem remote. It is not, I consider, either unpractical or unethical to suggest the need for such a move, however remote, in view of the present urgent call for national unity.

Beyond the eventuality of such a move, it remains possible for engineers only to expedite the national effort so far as they are individually able, by reason of their key positions, as already stressed. And then only in small ways. A review of the situation regarding the acceleration of technical training for men desiring to become skilled workers; the releasing of younger members for defence service by the retention or recalling of older members for

essential service needs; and other matters of a similar nature—would appear the only ways The Institution as a body can render any further national service.

One other aspect of Empire service, however, should perhaps be mentioned. During the past year, the Council decided to approach the Chartered Engineers of Great Britain, regarding the possibility of members here being prepared to offer help for the children of members in Britain. It would seem little enough for us to open our homes and our purses, so that men with similar tastes and principles might feel their children would not be passing entirely from the intellectual environment and influences to which they were accustomed, supposing it became necessary for their safety and for the future of the Empire, to send them overseas. A circular to this effect was duly sent to all our members. Just now, as you know, the evacuation of children from the Old Country, is for the time being suspended. Nevertheless, such a scheme might at any time be reorganised, and I know that I can promise that our members will not remain so unmoved by the conditions of affairs in Great Britain, as to be less ready to make sacrifices for the children of their professional brothers overseas than are the ordinary citizens of Australia. Most of us, I am sure, would feel happier, were we faced by a similar horrible situation, if we knew our families were going away into the guardianship of men of our own profession.

To speak of children is to visualize the future. Great as are the practical services rendered to the community by Chartered Engineers in time of war, it may be submitted that their services in the reconstruction period somewhere ahead, will be little short of all-embracing.

It is already universally acknowledged that the nation must begin to plan for peace, now, in the midst of war, lest we are caught unawares; lest the principles and securities for which we have fought are lost in the chaos of aftermath. As engineers we shall be called on to handle the raw material of reconstruction. Now is the time to consider the specifications to which we are prepared to build in the future. *Now is the time to make up our minds that we shall have more say than hitherto in the drawing-up of all such specifications as are considered necessary by those in authority for the growth and maintenance of a more secure and equitable world.*

It is pleasing to be able to state that the present Commonwealth Government is already thinking along these lines. For instance, in December last, the Minister for Labour and National Service, Mr. H. E. Holt, announced that the Reconstruction Division of his Department would begin operations early in the New Year. This year, that is to say. Mr. Holt said that, although any reconstruction policy would give rise to many differences of opinion, the Government would welcome wide public discussion of alternative and complementary proposals. He called for co-operation from State departments, from local governing authorities, from research workers and from professional and public bodies, especially naming The Institution of Engineers and the Chambers of Commerce and Manufacture. That Mr. Holt is fulfilling this promise has been shown by recent announcements in the press.

In addition, Sir Frederick Stewart has hinted that a national housing scheme might be another wartime social measure to follow the introduction of child endowment by the Commonwealth Government. The building of hospitals, such as the Community Hospital at Canberra, now in hand, and of houses for workers to meet the need arising from industrial expansion appear to be sound and necessary corollaries of wartime activity and cannot be regarded in the same critical light as works of general development.

It is self-evident that political and industrial reconstruction after the war, must present problems even more drastic than the war itself, and will consequently require correspondingly greater powers of national organisation. What we are concerned with is the exact way in which Australia will tackle the future, and how The Institution of Engineers can make the contribution we would wish.

With hostilities ended, the Commonwealth will be faced with instant cessation of the huge armament industry which has grown to meet the present need. Hundreds of thousands of men will lose their jobs, hundreds of thousands of pounds worth of machinery will become obsolete almost overnight, hundreds of thousands of troops returning from overseas, together with many more who have been engaged on military training, garrison work, general staff work, etc., within the continent, must add to a flood, which unless now guarded against, will swamp the labour market and endanger the foundations of that democratic structure which those very men have been working and fighting to preserve. It is probable that as many as a million men and their dependents will be closely affected by the change-over from war to peace. Moreover, our old markets abroad, for wool, wheat, meat, fruit, etc., will be small, and in any case there will probably be but few ships immediately available for commercial transport.

If, as seems to me a reasonable assumption, this slight sketch outlines the position likely to arise, it is obvious that we cannot too quickly begin, side by side with our war effort, to take concrete steps towards that preparation for peace which the majority of us incline to talk about as vaguely as once we discussed the possibility of war.

First, what do we as a people desire the future policy of Australia to be? If we cannot go forward to win the present fight without unity of action, then most assuredly we shall attain no lasting peace without some basic unity of thought. *On what general principle of national progress can we all agree?*

(Actually, since I wrote the foregoing paragraphs we have, almost daily in the press, been presented with more and more definite statements along similar lines, by most of the country's leaders. Steps seem likely to be taken towards the formation of an after-war policy.)

There have been many utterances, many declarations of democratic faiths and ideals, many sermons and not a few pious hopes. Of those which I have read, President Roosevelt, in his "Aid to Britain" speech given on the sixth of January, offered a summary which seems to suit the Australian mood. He said:—

> In the future which we seek to secure, we look forward to a world founded on four essentials of human freedom: Firstly, freedom of speech and expression throughout the world; secondly, freedom of every person to worship God in his own way throughout the world; thirdly, freedom from want which, translated into world terms, means economic understanding, securing for every nation in the world a healthy peacetime life for its inhabitants; fourthly, freedom from fear, which translated into world terms, means world-wide reduction of armaments to such a point and in such thorough fashion that no nation will be in a position to commit an act of physical aggression against any neighbour.

The general principle of this, I am sure, must appeal to all of us. But the particular post-war fact we must face and endeavour to wrestle with now, is what action will be necessary for bringing about that "freedom from want" for the inhabitants of Australia.

The aftermath of the last war was a terrible financial depression. The avoidance of a similar disaster will be the first stride towards freedom from want. But freedom from want cannot easily be avoided. The immediate stimulation of reconstruction, in war-wrecked countries, will only temporarily, perhaps even only very slightly, relieve the situation here, and, at best, can be but a passing solution unless we are able to co-ordinate the means of production and distribution.

Production, Distribution, Co-ordination. These three words might be said to present a combination, the secret of which yet remains to be solved but which, once solved, will open the door of the material world to a new era of constructive prosperity. It has been said that, in the spiritual sense, charity is greater than either faith or hope, so might one remark that in the material world, co-ordination is the most vital factor.

After this war, and until such time as world-trade is re-established, Australia, more than ever before, will have to rely upon her own resources. Not only shall we have to manufacture our own necessities—turning our guns into drills and electric servants—we shall have at the same time to find the funds to purchase what we make.

It might, for instance, prove necessary to continue our war-time rate of expenditure for, say, a year, so that the slowing down of industrial production will be no greater than is rendered unavoidable by the change from the manufacture of implements of war to implements of peace. Farmers, as well as workers generally, could benefit by a national housing scheme. In view of the gigantic disruption we must try to avoid, it might even be reasonable to supply primary producers and rural communities, at a nominal cost, with some of the amenities of modern life such as electric light and power, refrigeration, sewerage—services our city dwellers accept as part of decent modern existence.

At all times, when thinking ahead, we should realise that the last depression in Australia was merely the outer circle of a financial depression in other continents. This time, the centre of depression may well be in our own midst, as we ourselves are now a manufacturing continent, exporting a large quantity of goods abroad. Half measures and petty amelioration schemes will be of small avail. Gradually we are realising that we shall not win the war without sacrifice, throughout the whole community, of money, time and personal liberty. It would be well to face, also, the fact that we shall not attain recompense for present self-denial, if that spirit of sacrifice does not continue for a long time after we lay down our arms, and begin to congratulate ourselves on what is so frequently called " saving the world for democracy."

To say we believe in the democratic ideal is not enough. If, after the war, democracy is to survive, we must be actively and intelligently concerned in moulding its future. We must protect it, not only from its open enemies, but from our own selfish interests. We must maintain a critical attitude towards its many imperfections, not in order to destroy it, but in order to bring it nearer the perfection of our ideal. There is no *status quo* in the life of a community—we slide back or we go forward.

We most of us desire to go forward. To go forward, greater education is probably the first necessity. The Premier of Western Australia, Mr. J. C. Willcock, suggested recently a practical way in which the education of children can materially assist after-the-war settlement. He said :— " I think the school leaving age will probably be raised after the war, in order that the youth of the State will not come into competition with soldiers who will be returning to employment over a year or two." If this raising of leaving age once occurs, it will probably become an accepted necessity, and the youth of the nation will reap the benefit thereof for as long as Australians own Australia.

It is not, however, only the education of youth that will need more funds, more encouragement, more emphasis. Mr. J. R. Beard, in his Presidential Address* to the Institution of Electrical Engineers recently carried the point further.

" I suggest," he said, " that the comparative failure of the democracies to plan efficiently during the last 20 years has been due to twin causes : faulty education of both leaders and voters, and an exclusive tenderness towards small but influential minorities. Even a very limited degree of compulsion has been accompanied by so many checks and safeguards as to make it almost unworkable and exceedingly slow in action."

In other words, he considers not only a change, but an enormous change, to be desirable ; and that such a change in our way of life, which at present we merely call democracy, is invariably prevented from becoming the real thing by a small minority with influence.

Elsewhere in his address Mr. Beard further considers the necessity of education, for politicians and voters alike. He also holds the opinion that engineers must take a much greater part in the control of the world ; as he puts it— " direct their natural aptitude for logical thought, enhanced by training, to political and sociological forces."

Having then accepted the challenge to turn our attention to the betterment of more than the technical needs of mankind, how are we to make any beginning more practical than mere discussion ?

We might, I think, begin by showing greater interest in local government, by sitting on roads boards and becoming members of councils. We might take more definite part in State politics—engineers are noticeable by their absence from the seven Parliaments of Australia and the thirteen houses thereof. We might show ourselves more eager to sit on school boards and governing bodies of educational institutions generally.

In the past, we have tended to leave not only politics, but also the general direction of mankind, to members of the learned professions, whose knowledge and wisdom are concerned with the conduct of the individual and the community. More lately, business men have applied their knowledge and wisdom, which are concerned with the practical advancement of production and profits. Such direction may have best served the general interests of mankind in the scholastic and commercial periods before the Machine Age and the granting to scientists and engineers of University degrees. Now, the very term Machine Age calls those who are responsible for the machines, to become also responsible, at least in part, for the mental and social well-being of the peoples who handle them and live beneath their domination. Scientists and engineers combine practical minds with scholastic tradition—it should be possible for them to find, and hold, some measure of balance between conflicting intellectual and commercial viewpoints.

Engineering achievement is largely the conquest of natural forces. The harnessing of those blind forces to the use of man required patience, balance, a detached and philosophic outlook. These qualities, at their best,

*Inaugural Address, 24th. Oct., 1940. *The Journal of The Institution of Electrical Engineers*, Vol. 88, Part 1, No. 1, Jan., 1941, p. 16.

maintain a wisdom gained from contact with those very forces which for centuries seemed beyond the power of man to use for his own good, but which we have now taught him to control. Our professional balance, our acquired wisdom, our creative vision, we must begin to use for the benefit of our fellow men, in ways more far reaching than the immediate service of material convenience.

At one of our Institution gatherings, Sir Henry Barraclough remarked that the invention of the wheel had been said to mark the beginnings of civilisation. To-day, engineers have given wings to the wheel. We should therefore be the first people to realise that unless mankind can catch up, both emotionally and intellectually, with the enormous gap created by science between this century and the last, then the power of the wheel must eventually destroy that very civilisation it once began.

Wisdom and constructive thought alike demand that engineers shall not, in the future, allow the works of their minds and of their hands to fall casually to the false service of other men—men who for one perverted reason or another use such works, not for the common advancement of humanity, but for its final degradation.

Discussions & Communications.

PRODUCER GAS TESTS IN THE QUEENSLAND RAILWAY DEPARTMENT.

By C. Renton, A.M.I.E.Aust.*

Professor A. F. Burstall (Member), Mr. E. J. C. Rennie and *Mr. J. R. Bainbridge (Associate Members), Melbourne Division.* — This paper is very interesting in general, but particularly so in that, so far as the writers are aware, it gives the first published account in Australia of results obtained by the use of a supercharger.

In the opinion of the writers, some terms in the paper have been used rather loosely, and, in the interests of technical accuracy, it is felt that these should be pointed out.

In the third paragraph of the second column of the article, on p. 274, the word "efficiency" is used when the author obviously means the ratio of the power obtained on gas to that obtained on petrol, or more shortly, "the power ratio," a term widely used in connection with the use of producer gas.

Again, at the top of the first column on p. 275, the author mentions "effective compression ratio." His meaning is not entirely clear, but rather tends to give the idea that by the use of a supercharger the ratio of pressure after and before compression can be altered. In the writers' view there can be only one "compression ratio" defined in the usual way in terms of the clearance and stroke volumes.

The writers are entirely in agreement with the author in his opinion that the centrifugal supercharger can be of little use in such a connection. With this type it is not easy to obtain the excess pressure required, and the machine becomes ineffective at low speeds just when it is needed most.

The Author in reply.—The term "power ratio" would certainly have been more correct if used in the paragraph quoted. In regard to the term "effective compression ratio," however, if the paragraph in which this occurs is read in conjunction with the preceding and subsequent paragraphs it would seem to indicate that the author was referring to the fact that the higher initial pressure in the cylinder, when using a supercharger, creates a higher compression pressure than that caused by compressing an unsupercharged mixture into the same unaltered combustion space, thus giving the effect of a higher compression ratio. The supercharged power unit, in effect, becomes a two stage compressor, the first stage taking place in the supercharger. This term, therefore, in this case, seems to the author to have been more apt and its use justified when discussing the unit as a whole.

In any case there are two definitions of compression ratio in use—one in terms of clearance and stroke volumes as used, and another taking into account the position of the piston when the inlet valve has just closed. Perhaps, therefore, the author may be forgiven for coining a third definition.

*For text of paper, see The Journal, Vol. 12, No. 10, Oct., 1940, p. 274.

Roll of Honour.

Members on Active Service.

In any mention of the part which The Institution, or its members may play in Australia's war effort, pride of place must be given to those members who have enlisted for active service with one or other of the armed forces of the British Empire.

In endorsement of the above extract from its Twenty-first Annual Report, the Council of The Institution has directed the Executive Committee of the Council to take the steps necessary to secure the publication of a Roll of Honour. In recent months no effort has been spared to complete a statement of the names of those members who are on active service, but there are still many gaps in the records.

An urgent appeal is now made to all members who can forward to The Institution information regarding fellow-members known to be on active service. If there be a ready response, and surely this can be anticipated, there will, of course, be many duplications of relevant information, but it is better that this should be so than that the names of some serving their country and their Empire might be overlooked. If possible the rank and unit and approximate date of enlistment should be quoted.

New Year Honours.

In the 21st Annual Report*, a list was published of members who were recipients of honours conferred by His Majesty the King. The name of Lieut.-Colonel J. E. G. Martin, O.B.E., B.E., A.M.I.E.Aust., who had been made an *Officer of the Military Division of the Most Excellent Order of the British Empire*, should have been included therein, but, at the time of publication, confirmation of his honour had not been received from the authorities at Canberra.

An inquiry had been deemed necessary because the only available published references were to Lieut-.Colonel J. E. "C." Martin as the recipient of the award.

In civil life Lieut.-Colonel Martin is Engineer and Manager of the Rockhampton City Council Electricity Supply Department. He left Australia in command of the 2/9th Battalion, A.I.F., and proceeded to England with his Battalion. The award of the O.B.E. was made on the recommendation of the Commander-in-Chief, Home Forces. Congratulations are extended to him on behalf of all members.

*See The Journal, February, 1941, p. 37.